Parks and Recreation: Assessing Parks in Toronto

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1. Introduction:

a. Problem:

Parks are an essential part of urban management. Parks provide environmental, aesthetic, and recreational benefits to cities. They also bring about positive economic benefits; enhancement of property value, increasing municipal revenue, and bringing in homebuyers and workers.

In order to enhance the condition of parks in cities, many municipalities include Parks and Recreation departments that are responsible for overseeing the condition of existing parks and building new ones.

Toronto, Canada's economic capital, is well known for its beautiful parks and recreational spaces. In this project, we will aim to assess the situation of parks in Toronto. This will be done by identifying the boroughs that do not contain any parks, and that thus demand special attention from the parks and recreation department, then we will assess visitors' satisfaction with existing parks in Toronto as a means to see which boroughs need special park revamping.

b. Audience:

This project would be of interest to many stakeholders:

⇨ The parks and recreation department: this project would provide the department with up-to-date data about the situation of parks in the city. This data would thus give them valuable insights and help them make decisions.

➩ Visitors and dwellers of Toronto: This project would provide visitors and dwellers of the city of Toronto with information about the best parks in the city, based on ratings on Foursquare.

➩ Urban planning researchers: the data extracted through this project could also be helpful for anyone who would like to know more about the condition of parks in the city of Toronto.

2. Data:

The raw data used in this project has been taken from multiple sources:

a. Information about Toronto, its boroughs, and its neighborhoods:

This information was retrieved from the following Wikipedia page:

https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

This page contains, in tabular format, the different postal codes, boroughs, and neighborhoods that make up the city of Toronto.

b. Geospatial data:

For further analysis, geospatial data, chiefly latitude and longitude, were needed. This information was retrieved from two sources:

➩ GeoPy, a python client for several popular geocoding web services.

➩ The csv file Geospatial_coordinates.csv, which offers the geospatial data from each neighborhood in Toronto.

c. Venue data:

In order to know the venues in the city of Toronto and the customer satisfaction with parks, we used Foursquare API, which offers real-time data about venues in cities

across the globe as well as ratings, likes, and tips submitted by Foursquare users who have visited these specific venues.

3. Methodology:

a. Obtaining data about Toronto, its boroughs, and its neighborhoods:

We begin our analysis by first webscraping the Wikipedia page containing information about the postal codes, boroughs, and neighborhoods in the city of Toronto. We thus obtain a data frame containing the following data:

	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Queen's Park	Ontario Provincial Government

Figure 1: First five rows on Data Frame containing Postal Codes, Boroughs, and Neighborhoods of Toronto

We can thus start exploring this data by seeing how many neighborhoods there are by borough in Toronto and plotting the results in a bar chart.
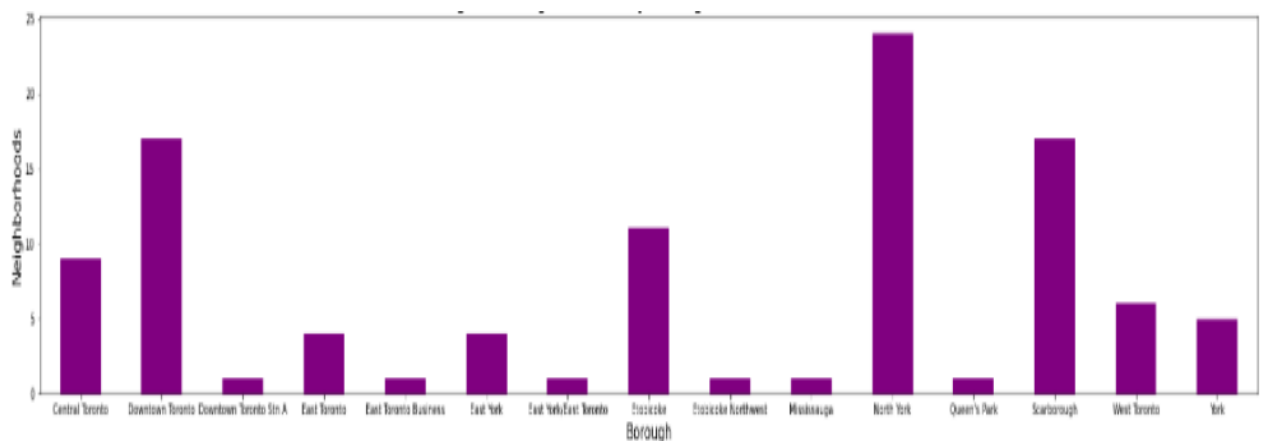

Figure 2: Neighborhoods by Borough in Toronto, Ontario

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However, in order to perform our analysis, we need to obtain the geospatial coordinates. We obtain this information from Geospatial_coordinates.csv. The data obtained is as follows:

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.7533	-79.3297
1	M4A	North York	Victoria Village	43.7259	-79.3156
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.6543	-79.3606
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.7185	-79.4648
4	M7A	Queen's Park	Ontario Provincial Government	43.6623	-79.3895

Figure 3: Latitude and Longitude of Toronto Postal Codes

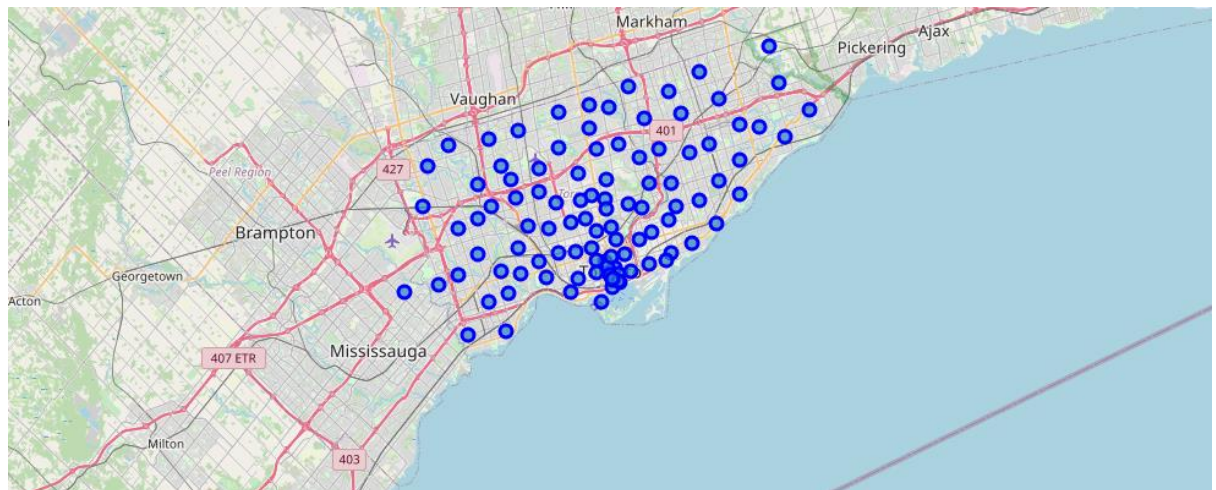Using the data obtained so far, we can visualize Toronto and its neighborhoods via a Folium map:

Figure 4: Map of Toronto and its Neighborhoods

b. Obtaining data about venues in Toronto:

Using the data obtained so far, we can now retrieve information about the venues in

each neighborhood in Toronto. The data was retrieved using Foursquare API.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category
2129	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999	Jim & Maria's No Frills	4b4a2c3ff964a520507d26e3	43.631152	-79.518617	Grocery Store
2130	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999	Royal Canadian Legion #210	50775788e4b0b61558fb5e57	43.628855	-79.518903	Social Club
2131	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999	Koala Tan Tanning Salon & Sunless Spa	4c2e6d1d16adc928d3debb9c	43.631370	-79.519006	Tanning Salon
2132	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999	Value Village	59023da39746172d9dea9b60	43.631269	-79.518238	Thrift / Vintage Store
2133	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999	Kingsway Boxing Club	4c8821e9bbec6dcb7b93d158	43.627254	-79.526684	Gym

Figure 5: Venues in each neighborhood of Toronto, retrieved from Foursquare API

This data shows that Toronto contains 274 unique venue categories, encompassing coffee shops, Spas, Restaurants, parks and much more.

c.   Assessing parks in Toronto:

For the sake of our study, we will focus on parks. Following is the list of boroughs and neighborhoods that contain parks in Toronto:

	Borough	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue ID	Venue Latitude	Venue Longitude	Venue Category
0	North York	Parkwoods	43.753259	-79.329656	Brookbanks Park	4e8d9dcdd5fbbbb6b3003c7b	43.751976	-79.332140	Park
12	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636	Corktown Common	51ccc048498ec7792efc955e	43.655618	-79.356211	Park
25	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636	Underpass Park	4ddfbaca185035f3a44e8df6	43.655764	-79.354806	Park
36	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636	Parliament Square Park	4c16a548955976b0cadea4f6	43.650264	-79.362195	Park
63	Queen's Park	Ontario Provincial Government	43.662301	-79.389494	Queen's Park	4b9d206bf964a520e69136e3	43.663946	-79.392180	Park
165	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937	College Park Area	4c8facf91664b1f79c90aa2f	43.659453	-79.383785	Park
217	North York	Glencairn	43.709577	-79.445073	Fraserwood Park	4e8eec51f9f4680c30c6968b	43.713550	-79.442482	Park
243	East York	Woodbine Heights	43.695344	-79.318389	Stan Wadlow Park	4c012a56efa2ef3b516daa8c	43.697836	-79.314303	Park
268	Downtown Toronto	St. James Town	43.651494	-79.375418	Berczy Park	4bb79860cf2fc9b616779e02	43.648048	-79.375172	Park
278	Downtown Toronto	St. James Town	43.651494	-79.375418	St. James Park	4bb3b268eb3e9521cd82cb0a	43.650425	-79.372311	Park

Figure 6: Boroughs and Neighborhoods in Toronto that contain parks

This shows that Toronto has a total of 52 parks. We can further explore how many parks there are per borough.
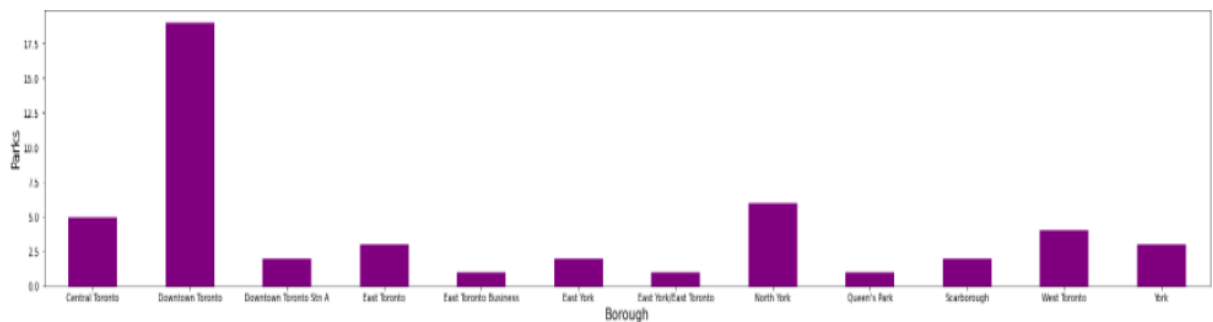

Figure 7: Parks by Borough in Toronto, Ontario

From this analysis we can see that 13 boroughs out of Toronto's 15 boroughs contain parks. This means that the 2 boroughs, which are Mississauga and Etobicoke Northwest do not contain any parks.

Let's visualize the location of parks in Toronto:

Figure 8: Map of parks in Toronto

Now we move to the examination of visitors' satisfaction with existing parks. We obtain

details about each park from Foursquare.

	Venue ID	Venue Likes	Venue Rating
0	4e8d9dcdd5fbbbb6b3003c7b	12	6.9
1	51ccc048498ec7792efc955e	45	8.6
2	4ddfbaca185035f3a44e8df6	29	9.0
3	4c16a548955976b0cadea4f6	16	7.9
4	4b9d206bf964a520e69136e3	172	8.6
5	4c8facf91664b1f79c90aa2f	10	8.3
6	4c012a56efa2ef3b516daa8c	5	5.9
7	4bb79860cf2fc9b616779e02	25	8.6
8	4bb3b268eb3e9521cd82cb0a	67	7.6
9	4bb79860cf2fc9b616779e02	25	8.6
10	4c8facf91664b1f79c90aa2f	10	8.3
11	4b193b23f964a520a4d923e3	43	7.1
12	4c51ca66b6dabe9a06ef5112	4	6.5
13	4b642db1f964a520b7a22ae3	83	9.1
14	4e49413e81dc766f3e3d6312	109	9.3
15	4ad4c05ef964a520bdf620e3	520	9.3
16	4baa029cf964a52085433ae3	87	8.3
17	4bb79860cf2fc9b616779e02	25	8.6

Figure 9: Details about each park in Toronto in terms of likes and rating on Fousquare.com

Using this data, we can order the boroughs of Toronto from best to worst according to the average rating of parks. The results are as follows:

	Borough	Average Rating
6	Queen's Park	8.600000
0	Central Toronto	8.375000
1	Downtown Toronto	8.374074
2	Downtown Toronto Stn A	8.266667
7	West Toronto	8.100000
3	East Toronto	7.850000
5	North York	6.900000
4	East York	5.900000

Figure 10: Average rating of parks per borough in Toronto

Finally, we can visualize the results obtained on a bar chart.
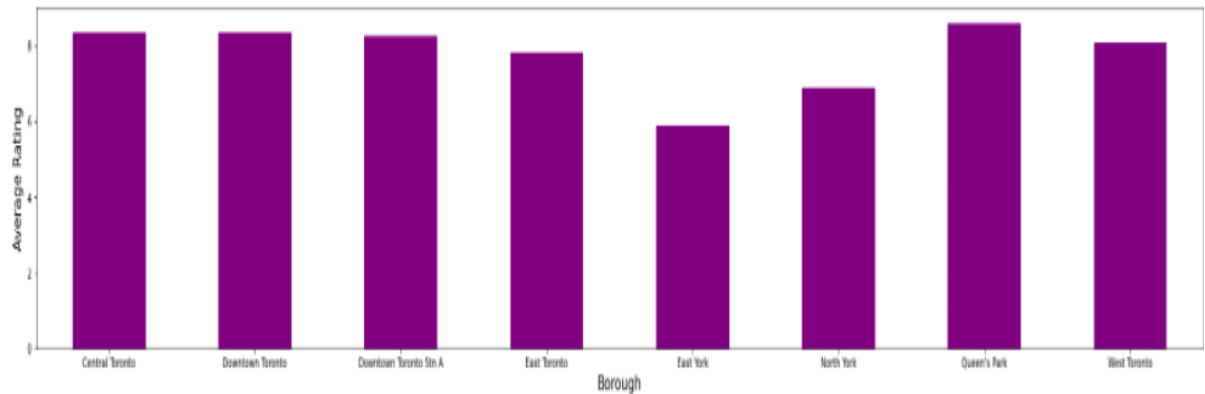

Figure 11: Average rating of parks per borough in Toronto

4. Results:

The detailed analysis presented in the Methodology section has led the following

results:

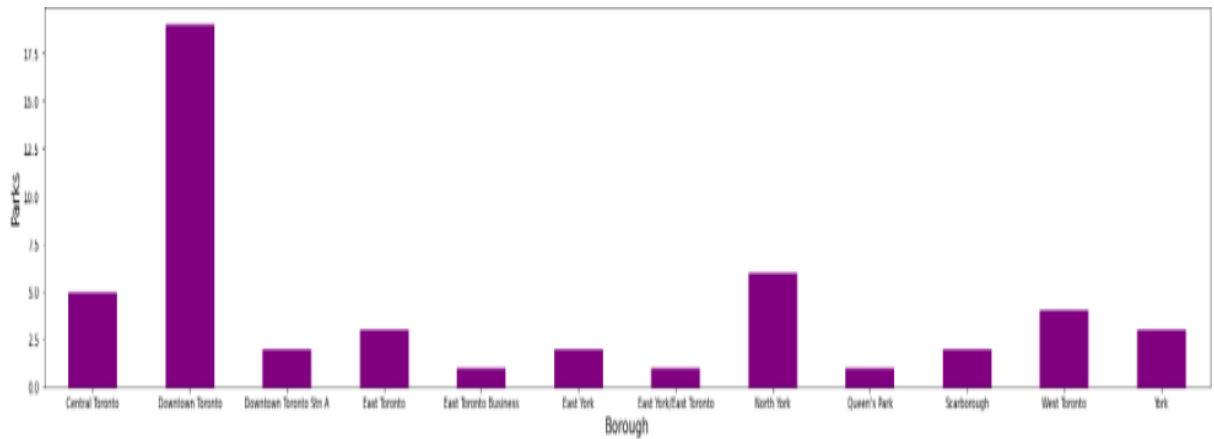The existence of 52 parks in the city of Toronto distributed all follows:

Figure 12: Distribution of parks by borough in Toronto

Such that the greatest number of parks exists in the borough of Downtown Toronto and the least number of parks is in East Toronto/Business.

The analysis also shows that there are no parks on the boroughs of Mississauga and Etobicoke Northwest.

Furthermore, we were able to rank the boroughs according to average rating of parks. The ranking is as follows:

	Borough	Average Rating
6	Queen's Park	8.600000
0	Central Toronto	8.375000
1	Downtown Toronto	8.374074
2	Downtown Toronto Stn A	8.266667
7	West Toronto	8.100000
3	East Toronto	7.850000
5	North York	6.900000
4	East York	5.900000

Figure 13: Ranking of boroughs by average rating of parks

5. Discussion:

Now that the analysis has been performed and the results extracted, we can discuss these results and make recommendations.

First, the results show that parks are not distributed equitably across the city of Toronto. For example, boroughs that have a greater number of neighborhoods and thus a larger population do not necessarily benefit from a greater number of parks (the borough of North York, for instance, has the greatest number of neighborhoods but contains a much lower number of parks compared to other boroughs).

Another testament to this is the fact that the boroughs of Mississauga and Etobicoke Northwest do not contain any parks. This suggest that the parks and recreation department of the city of Toronto should pay special attention to these boroughs.

Second, the results indicate that a large number of parks in a certain borough does not necessarily translate into greater visitor satisfaction. The borough of Queen's park, for example has the highest rating although it contains the lowest number of parks.

And last, these results give the ranking of boroughs by visitor satisfaction, thus indicating that the boroughs of North York and East York are performing poorly and should be given special attention.

6. Conclusion:

In this project, we were able to explore the parks in the city of Toronto, extract valuable information, and make recommendations. However, it must be emphasized that the conclusions we have reached depend greatly on the data on Foursquare, which does not give the full picture. For a more comprehensive analysis, other data sources should be

used. Furthermore, this work remains limited since we did not explore the specific

reasons explaining the discrepancy is ratings between boroughs. Such information

would be highly valuable in order to identify the features that need to be improved in

each park. In future expansions of this project, we will aim to enhance it in this direction.